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AUTHOR Esler, William K.
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ABSTRACT

This review of current research on teaching focuses upon studies of teaching behaviors and their relationship to student performance. In considering research on classroom climate, examples are presented of studies which used the Flanders Interaction Analysis System (FIAC) to investigate relationships among student achievement and teacher-initiated talk, teacher questions, teacher lecture, teacher use of directions, and pupil-initiated talk. Studies are also cited which used the FIAC to investigate teacher directness and indirectness and pupil achievement. Further studies are identified which reviewed teachers' use of praise and criticism and pupil attitudes. A summary is presented of studies which compared open and traditional teaching approaches. A description is given of several research efforts on classroom management and discipline. Research findings on behavior modification are summarized. (JD)

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A Review of RESEARCH ON TEACHING

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William K. Esler

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RESEARCH ON TEACHING

Introduction

Research on teaching is today undergoing changes. Studies in the 1950's and 1960's were often investigations of teacher traits, methods of teaching, and classroom climate. Current research centers move upon the behaviors and decision making of teachers as related to pupil performance.

Early research on teaching tended to study the effects of teacher characteristics such as sex, age, length and type of training, and personality upon proficiency ratings made by administrators and other observers. For a period of time the styles and methods of teaching were heavily investigated. These studies often explored the effects of direct and indirect teaching practices and certain dimensions of classroom climate such as the use of questions and reinforcement of pupil behaviors. Studies on classroom climate often involved elaborate systems for observing and interpreting verbal and non-verbal behaviors of both teachers and students. Some of the observation instruments required the investigators to record teachers and student behaviors each few seconds as they sat in live classrooms or listened to audio tapes.

Current research on teaching often relates teacher behaviors to student achievement, the ultimate test of teaching effectiveness. These studies tend to incorporate systems of classroom observation that permit the relationship of various teaching strategies and student achievement to be determined.

Classroom management and discipline have also been areas that have attracted the interest of researchers. Studies in these areas have often involved investigation of the effects of principles of behavior modification upon the learner, and in one series of studies the identification of the effective management behaviors of teachers and their effects upon the classroom climate.

The study of teaching over the years has not yielded universally accepted guidelines for prescribing teacher behaviors that ensure optimum performance in all teaching situations. There have been found, however, certain relationships between teacher behaviors and student learning that have been fairly strongly established. The practices that seem to produce the best results in terms of student achievement, attitudes, problem solving ability, creativity, and other desired behaviors, may serve as guides for teachers. Teaching behaviors and their relationships to student performance will be explored in some detail in the following pages.

RESEARCH ON CLASSROOM CLIMATE

A number of systems designed to investigate classroom interaction were developed in the decade of the 1960's. One of the most popular was the Flanders Interaction Analysis System (FIAC). In employing

this system the observer categorized each three second time period of classroom interaction as one of the following concepts or operations.

Categories provided in FIAC. (From Amidon and Flanders, 1963, p. 14)

Teacher talk	Indirect influence	1. Accepts feeling: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
		2. Praises or encourages: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "uh huh?" or "go on" are included.
		3. Accepts or uses ideas of student: clarifying, building, or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category five.
		4. Asks questions: asking a question about content or procedure with the intent that a student answer.
	Direct influence	5. Lectures: giving facts or opinions about content or procedure; expressing his own idea; asking rhetorical questions.
		6. Gives directions: directions, commands or orders with which a student is expected to comply.
		7. Criticizes or justifies authority: statements, intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing, extreme self-reference.
Student talk		8. Student talk-response: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.
		9. Student talk-initiation: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.

10. Silence or confusion: pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observer.

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11. Teacher talk: the proportion of lesson time devoted to teacher utterances; the total frequences of categories one through seven above.

12. Pupil talk: the proportion of lesson time devoted to pupil utterances; the total frequencies of categories 8 and 9 above.

Some interesting findings have resulted from a comprehensive analysis of many research studies which employed the FIAC.

Teacher Talk - Teachers talk from one half to two thirds the time that classroom interactions are taking place, while the students talk about 25% to 35% of the time, with some time usually occupied by silence and confusion. At best it would appear that on the average a single student in the typical classroom speaks only about 1/30 of the time taken up by the teacher. Much of the thrust and the basic proposition of the research using the Flanders instrument centered about the desirability of reducing teacher talk and increasing student talk. However, in terms of reported results it was never established that the amount of teacher talk was significantly related to pupil achievement.

Various studies have reported teacher talk to be positively related to student achievement, while other studies indicated a negative relationship, and yet others reported no relationship between the two variables. Some educators have suggested it may be more useful to concentrate upon improving the quality of the utterances of teachers rather than to directly work to reduce the amount. The amount of teacher talk has also been variously reported as not affecting pupil attitudes, and also as both enhancing and detracting from positive pupil attitudes. Obviously, little can be said

with certainty regarding the effect of teacher talk upon forming pupil attitudes.

Teacher Questions - Teachers asking questions was found to comprise about one tenth to one sixth of all classroom interaction time. Teachers in higher grade levels ask fewer questions than those in lower grade levels. It appears a contradiction that the more pupils know and the better equipped they are to mentally process information the fewer questions they are asked. The use of questions by the teacher has resulted in contradictory research findings in relation to student achievement and attitudes; the greater use of questions has been shown to be both unrelated to and positively related to both pupil achievement and attitudes. While again the chicken soup theorem would appear to be valid regarding the greater use of teacher questions, (they can't hurt and they might help) attention might be better directed toward improving the quality and context of teacher questioning rather than focusing on the amount of time devoted to the activity.

Teacher Lecture - Teachers use of lectures comprised a sixth to a fourth of classrom interaction time. The lecture was more common in the higher grade levels than the lower, and less common with teachers labeled as being humanistic. The use of lecture is associated with higher student achievement, but the standards of achievement usually objective teacher made or standardized tests may be associated with those skills and knowledge that may be best learned directly.

Teacher Use of Directions - Approximately one-tenth of classroom interaction time was occupied by giving directions, with the amount of time spent on this function diminishing in the upper grades. The effect of this variable upon pupil achievement has not been reported. (Dunkin and Biddle, 1974, pp. 139-140)

Pupil Talk - Pupil talk occupied one-fifth to one-third of classroom interaction time with the amount of pupil talk diminishing in the upper grades. Apparently since the lecture as an instructional strategy is more popular with teachers in the higher grades, pupils are offered fewer opportunities to talk during the classroom interaction. The amount of pupil talk has not been established as being related to pupil achievement. As experimental variables, pupil talk and achievement are too undefined to yield definitive results. (Dunkin and Biddle, 1974, pg. 140) Pupil responses to teacher initiated talk constituted about twenty percent of all classroom interactions. Though teachers rated as superior generated more pupil responses than those not so rated, there is no evidence that this factor is positively related to pupil achievement. However, a greater amount of pupil initiated talk appears to result in higher achievement of pupils. There may be a qualitative difference between learning activities wherein pupil respond to teacher questions and where pupil to pupil discussions occur.

TEACHER INDIRECTNESS-DIRECTNESS

The Flanders Interaction Analysis system of classroom observation, permitted the description of classroom interactions between teachers and pupils as being direct or indirect. In this system the direct teaching stressed lecturing, criticizing student behavior, and giving directions (Flanders categories 5-1). Indirect teaching was characterized by the use of praise. questioning as a teaching strategy, and the acceptance of pupils' ideas and feelings (Flanders categories 1-4). The terms direct and indirect described the classroom climate as well as teaching strategies.

Summary - The findings of a number of studies indicated that more teacher behavior is direct than indirect, that there is more lecturing, direction giving, and criticism in classrooms than questioning, praise, and the acceptance of pupil feelings and ideas. These studies indicated that teachers talked about two-thirds of the time during a school day and students talked about one-third of the time. There is some evidence also that higher achievement of pupils of both high intelligence and higher social class is associated with greater teacher indirectness.

Teacher Characteristics Affecting Directness-Indirectness - Some factors that appear to enhance the indirectness of teachers and reduce the tendencies for direct instruction are: higher scores on certain tests of the National Teachers Examination (NTE), traditional teacher training programs (when compared to "certification only" programs) and greater "ego strength." (Dunkin and Biddle, 1974, pg. 117). Other teacher characteristics have produced mixed results in their relationship to the amount of direct-indirect teacher behavior. Several characteristics that have been studied are the sex of the teacher and personality traits such as authoritarianism, and humanistic attitudes. (Dunkin and Biddle, 1974, ppg. 113-114).

Directness-Indirectness and Pupil Achievement -

Studies of the effect of the amount of indirect instruction upon pupil achievement have produced mixed results. About equal numbers of studies have indicated that teacher indirectness is unrelated to pupil achievement as have shown that teacher indirectness is positively associated with pupil achievement. There is evidence that indirect teachers

are more effective in teaching abstract learning than concrete facts, and are more effective in securing pupil achievement in such areas as vocabulary building than they are in raising pupil scores in mathematics and reading. Indirect teacher behaviors have produced ambigious results in studies conducted with average pupils, but have found to produce positive results in manipulative performances of average pupils, and in achievement of dependent prone pupils and high ability pupils (Dunkin and Biddle, 1974, pg. 114).

Indirect teacher behaviors have according to some studies resulted in greater pupil creativity, lower pupil anxiety, and a better attitude toward the teacher,

Teacher's Use of Praise and Criticism -

In the studies reviewed teachers on the average tended to use praise and criticism equally - about 6% of the time for each. Research on the use of praise and criticism indicated that although teachers in lower social class schools use more praise than teachers in middle class schools, black students receive less teacher praise (and more teacher criticism) than do white pupils. It is also indicated that high achieving students receive more teacher praise than low achievers. (Dunkin and Biddle, 121-130)

Teacher Praise, Teacher Criticism and Achievement -

The results have been mixed on the effect of teacher praise and criticism upon pupil achievement. Some studies indicated no relationship existed between praise or criticism and pupil achievement, while others indicated a positive relationship did exist between teacher praise and pupil achievement, and a negative relationship between teacher criticism and pupil achievement. It is significant to note that research does not

demonstrate a positive relationship to exist between teacher criticism and achievement nor a negative relationship between teacher praise and pupil achievement. Like the proverbial chicken soup, teacher praise cannot hurt pupil achievement, and may help, and like crabapples, teacher criticism can cause pain if overdone.

Teacher Praise and Criticism and Pupil Attitudes -

The findings of studies have contradicted one another on the issue of the effects of teacher praise and criticism on pupil attitudes. Some research indicates a lack of relationship between the praise-criticism behaviors of teachers and pupil attitudes, while others have indicated that a strong relationship exists, and that the use of praise by the teacher enhances the attitudes of pupils and builds their self-concepts. Greater teacher criticism has been found in some studies to result in diminished pupil achievement motivation, higher fear of failure, lower self-concept, and higher pupil dependency upon the teacher. Overall it would appear (ppg. 121-126) that the judicious use of praise by teachers may have positive effects upon the performance and attitudes of pupils.

Research on Effective Teaching of Basic Skills

Teaching Basic Skills - The curriculum in the schools today carries a strong emphasis upon teaching the basic skills. Commonly the definition of basic skills is limited to the study of reading and mathematics. It is natural that there exists an interest in determining the best way to foster student achievement in these subjects.

Achievement in reading and mathematics is almost always defined by a student's ability to respond to objective test items. The items that appear upon the achievement tests are constructed to be specifically

related to narrowly defined skills in the two subjects. Instructional materials for developing mathematics and reading skills also tend to be very specific in terms of content and structure, often closely duplicating in form and substance the actual items that appear upon achievement tests. The focus of much new research and review of prior research has been on finding the teacher behaviors that maximize student achievement in the finely defined, well structured reading and mathematics curricula.

One widely quoted research review on classroom teaching written by Barak and Rosenshine, generated a great deal of interest in a construct called direct instruction. Direct instruction is defined as teaching that has a strong academic focus and high teacher direction with the use of structured and sequential materials. Direct instruction is also associated with clearly defined goals, the extensive coverage of content, and monitored student performance. The subject matter in the direct instruction classroom is typically of a low cognitive level and students receive immediate feedback on the correctness of their work. (Rosenshine, 1979, ppg. 28-56)

For teaching the basic skills, Rosenshine reported that activities that were directed by the teacher were more effective than those that provided students choices. He also found that large group instruction in a single activity produced greater achievement than small group instruction with multiple activities. For teaching low level socio-economic children mathematics and reading, it appeared the use of low cognitive level questions, drill and controlled practice produced the best results and the use of workbooks and worksheets that contained materials that closely resembled the achievement test items were effective.

Another factor that correlated significantly with student achievement in the basic skills was the amount of content coverage.

The amount of content covered by students was defined by the amount of time students spent academically ergaged in activities that were appropriate in terms of their abilities and knowledge. Pupils who spent the greater amount of academically engaged minutes generally scored higher on achievement tests. According to Rosenshine, the teacher who wishes to achieve success in teaching the basic skills would be advised to engage students in highly structured activities, to maximize academic engagement time, to ask low level questions, teach the whole class a single topic, and create a controlled, but convivial classroom atmosphere

Direct (Traditional) vs. Open Instruction

Penelope Peterson summarized the findings of Robert Horwitz's review of nearly 200 studies on classroom teaching and her own review of 122 studies as to the effects of traditional and open teaching practices upon various cognitive and affective learning outcomes. Her findings are summarized in TABLE I.

The studies reviewed by Peterson favored the traditional teaching approach when the criteria for success were Achievement-composite, Achievement-mathematics, Achievement-reading, but favored the open approach when the criteria for success were Creativity, Problem solving, or various aspects of the affective growth of children. Horwitz's conclusions which resulted from his review of research literature closely paralled those of Peterson. He found that success associated with a particular teaching style was highly dependent upon instruction purpose. In this review the educational goals related to creativity and the affective aspects of learning were found to be better attained most often with the open approach to teaching rather than the traditional and achievement oriented goals were better attained by traditional teaching practices.

The apparent conclusions generated from the large review of research on classroom teaching is that the effects upon learning of particular teaching strategies is highly situational with the attainment of certain educational goals favoring the traditional classroom and direct teaching and others favoring the open classroom and indirect teaching. Clearly it cannot be stated universally that either direct teaching or indirect teaching is best for all purposes.

TABLE 1

Summary of studies comparing open and traditional teaching approaches (Peterson, 1979, pg. 144)

Educational outcomes	Peterson review				Horwitz review[b]				
		Size of effect[a]				Percentage of studies showing -			
	Number of studies	Mean	Median	Range	Number of studies	Open is better	Traditional is better	Mixed results	No difference
Cognitive									
Achievement-composite	25	-.12	-.20	- .78 to + .41	102	14	12	28	46
Achievement-mathematics	18	-.14	-.04	-1.01 to + .58	-	-	-	-	-
Achievement-reading	20	-.13	-.22	- .72 to + .44	-	-	-	-	-
Creativity	11	.18	.32	- .23 to + .50	33	36	0	30	33
Problem solving	1	.98	.98	-	-	-	-	-	-
Affective									
Self-concept	14	.16	.16	- .14 to +1.45	61	25	3	25	47
Attitude toward school	15	.12	.21	- .43 to + .48	57	40	4	25	32
Attitude toward teacher	2	.42	.42	.29 to + .56	-	-	-	-	-
Curiosity	3	.14	.08	- .17 to + .52	14	43	0	36	21
Locus of control	5	.03	-.14	- .34 to + .70	24	25	4	17	54
Anxiety	5	.07	.41	- .63 to + .69	17	18	29	6	47
Independence	3	.30	.29	+ .07 to + .55	23	78	4	9	9

[a] A positive effect size favors the open approach; a negative effect size favors the traditional approach.

[b] From Robert A. Horwitz, "Effects of the 'Open Classroom,'" Educational Environments and Effects: Evaluation, Policy, and Productivity, ed. Herbert J. Walberg. (Berkeley, California: McCutchan Publishing Corp., 1979), chap. 14

RESEARCH ON CLASSROOM MANAGEMENT AND DISCIPLINE

J. S. Kounin developed a unique system for viewing classroom management and discipline and conducted a considerable amount of research in the area. In his work Kounin defined eight factors that he believed were variables in determining a teacher's ability to control the climate of the classroom

Concepts of Teacher Behavior Affecting Classroom Climate (Kounin, 1970)

Term	
Withitness -	the ability to spot the first signals of deviant behavior, and call down the proper pupil, while ignoring minor infractions; to communicate to pupils by her behavior that she knows what is going on.
Overlappingness-	the ability to deal with two matters simultaneously, i.e., discipline a second child while tutoring a first.
Smoothness -	ability to maintain the smooth flow of a lesson without interrupting or changing directions.
Momentum -	ability to maintain the pace of a lesson, to refrain from dwelling on peripheral and incidental behaviors and physical settings.
Group Alerting -	the ability to involve all children in activities, maintain pupils attention, and maintain a state of alertness.
Accountability -	the ability to hold the children responsible for their task performances, i.e., making them display their work or show hands if the task is completed.

Term	
Valence And Challenge Arousal -	the ability of the teacher to arouse enthusiasm, curiosity, or involved with academic affairs; examples of positive valence and challenge arousal behavior are showing zest and enthusiasm, pointing out the positive attributes of an activity, pointing out the special intellectual challenge of a situation, by participating in the activity, etc.
Variety -	the frequency that the teacher changed the nature of the activity; includes shifts in content, presentation pattern, props (media), grouping, location, etc.

Kounin employed two criteria to describe classroom climate or the level of discipline, These terms were "work involvement" and "deviancy". The degree of work involvement was determined by observers periodically (each few seconds) recording the degree to which students were involved with their assigned tasks. The deviancy factor was defined by the frequency of observed deviant behavior of pupils. A high work involvement score and a low incidence of deviant behavior would characterize a healthy or positive classroom climate. Kounin related the eight concepts of teacher behavior he believed to affect classroom climate to each of the two descriptors of classroom climate. The following chart contains a summary of concepts related to teacher style and the two classroom climate descriptors. You will notice that the effective teacher style factors are different for periods when the pupils are involved with seatwork and when they are involved with recitation.

CHART

Teacher Style Factors Found Effective
In Setting A Positive Classroom Climate

Classroom Climate	Effective Teacher Style Factors	
	Recitation	Seatwork
Work Involvement	Withitness Smoothness Momentum Group Alerting Overlappingness Accountability Valence	Variety Withitness Smoothness Valence
Deviancy	Withitness Momentum Overlappingness Smoothness Group Alerting Accountability Valence	Withitness Overlappingness Smoothness Momentum Group Alerting Valence Variety

The relative strengths with which the teacher style factor affected the classroom climate are shown by their order under each heading. For example, teacher withitness was found to have the strongest relationships among the factors to pupils' work involvement during recitation periods and on reducing deviant behavior during both recitation and seatwork activities. Another interpretation of the data is to note those Teacher Style Factors that are strongest in producing a positive classroom climate in each of the two types of activities,

Recitation and seatwork. The three Teacher Style Factors that most affect classroom climate during recitation activities are withitness, smoothness, and momentum for greatest work involvement and withitness, momentum, and overlappingness for producing less deviant behavior. The three factors most affecting classroom climate during seatwork activities are variety, smoothness, and valence for work involvement and withitness, overlapping, and smoothness for controlling pupil deviancy.

At this time no research has been reported that relates the teaching style factors of Kounin to pupil attitudes and achievement. However, other studies have indicated that time learners spend on meaningful and appropriate learning tasks correlate very strongly with pupil achievement, especially in the basic skills subjects (Rosenshine, 1979, p. 47).

It would appear the Kounin's work involvement variable may be closely associated with the academically engaged time variable reported by Rosenshine. The possibilities are good that teachers who exhibit the attributes of withitness, smoothness, momentum, group alerting, overlappingness, accountability, and valence which tend to maximize work involvement will also enhance the academic performance of their pupils. However, research is yet to be completed that demonstrates this relationship.

Behavior Modification, Discipline and Achivement -

Principles of behavioral psychology applied to the classroom have resulted in programs wherein various types of rewards are employed to extinguish undesirable behaviors and increase the incidence of desirable behaviors. The reinforcers vary a great deal in nature. They are sometimes physical rewards such as gifts or tokens that are traded for objects of value or for such concessions as free time, films, play time and others.

Reinforcers or rewards may also be a teacher's verbal praise or criticism (negative reinforcers), or non-verbal, say a smile or frown from the teacher, sometimes accompanied by touching. Research literature on teaching is rich in studies that relate various types and schedules of rewards to student discipline and achievement. Dunkin and Biddle, as a result of the review of twenty-six studies of behavior modification discovered a number of results that were common. (Dunkin, Biddle, 1974, pp. 169-222 These are summarized in the following list.

Review of Useful Findings on Behavior Modification

Teacher praise (as a positive reinforcer of acceptable behavior) reduces the amount of pupil deviancy.

Teacher criticism (as a negative reinforcer of deviant behavior) sometimes does not affect the amount of pupil deviancy, and sometimes does reduce the amount of deviant behavior.

Teacher use of material incentives (as a positive reinforcer of correct responses) increases proportion of correct responses.

Teacher use of extrinsic tokens (as a positive reinforcer of acceptable behavior) reduces the amount of pupil deviancy.

Teacher use of extrinsic tokens (as a positive reinforcer of acceptable behavior) increases pupil attendance.

Teacher use of extrinsic tokens (as a positive reinforcer of correct responses) increases proportion of correct responses.

Teacher use of extrinsic tokens (as a positive reinforcer of acceptable behavior) increases pupil achievement, and increases the achievement of nontarget pupils.

Teacher use of response manipulation (as a positive reinforcer of acceptable behavior) increases the amount of pupil tasks involvement and decreases the amount of pupil deviancy.

Teacher use of peer manipulation (as a positive reinforcer of acceptable behavior) decreases the amount of pupil deviancy.

One of the shortcomings of many studies of behavior modification is that the target groups of the studies were frequently students and classes who presented problems of serious deviancy. The effects upon normal classes are not well known. However, from the research data it is reasonable to conclude that the amount of pupil deviancy can be reduced by various types of stimuli if employed in programs of consistent reinforcement, including praise, material incentives, extrinsic tokens, response manipulation and peer manipulation. Furthermore studies show it to be more useful to dwell upon pupils successes than on their failures.

Discussion and Conclusions

Reviews of research on teaching are very difficult to conduct. The creators of the original field research often use different terms for similar aspects of teaching and learning. Sometimes the terms or varibles employed are not clearly defined, and often when they are clearly understood their definitions overlap one another and are not identical. Open instruction means one thing to one researcher and something quite different to another as does the term traditional instruction. Reinforcement may appear in various studies as tokens, gifts, punishment, repeated activities or statements, or the teacher's smile. Some noted reviewers describe the relationships among the various studies done over a couple of decades as "chaotic", "disappointing", or "fruitless." (Waxman, 1982, p. 104)

In spite of the problems stemming from attempting to synthesize the results from a broad spectrum of research studies Waxman and Walberg, after systematically reviewing nineteen separate reviews of research on teaching concluded there is much of value to be learned from the research efforts. They stated:

> "Notwithstanding the faults of the primary research and further objuscation of the review, the results seem to be strong and robust enough to emerge with a fair amount of consistency..." (Waxman, Walberg, 1982, pg. 118)

Some generalizable relationships do appear from examining numerous research studies on teaching conducted over a long period of time. It is the accumulation of data and the aggregate conclusions that yield substantive guidelines for teacher behaviors in the classrooms.

Conclusions derived from single studies, and perhaps even a single review of studies should be viewed with some skepticism. The task is to extract those relationships between teaching behaviors and learning that appear consistently in the literature while recalling the situational limitations and problems of design and definition that typically create clouds of uncertainty surrounding a few mountains of enlightenment. Overgeneralization of results is perhaps the greatest single misuse of research in education. Such abuses have a tendency to create simplistic answers to complex issues, and ultimately reduce the credibility of all empirical experiences both within and without the profession. The vast amount of research on effective teaching that has been conducted provides some meaningful direction for teachers who wish to develop skills and structure learning activities to produce the best results in terms of pupil performance. And when employed with discretion guidelines derived from research may supercede intuition as the chief architect of teaching behavior

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